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NEW SPECIES OF CADDISFLIES (TRICHOPTERA) FROM ALABAMA

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Abstract.—Five new species of Trichoptera, *Agapetus* ***alabamensis*** (Glossosomatidae), *Ochrotrichia* ***elongiralla*** (Hydroptilidae), *Theliopsyche* ***tallapoosa*** and *Lepidostoma* ***weaveri*** (Lepidostomatidae), and *Nectopsyche* ***paludicola*** (Leptoceridae) are described and illustrated.

In the course of a continuing survey of the caddisflies of Alabama, five undescribed species were collected. These new species, one each in the genera *Agapetus, Ochrotrichia, Theliopsyche, Lepidostoma,* and *Nectopsyche* are described and diagnosed herein.

Agapetus are represented in all faunal regions, except the Neotropical, with 30 species known from North America (Wiggins, 1977, 1984). *Ochrotrichia* and *Nectopsyche* are both restricted to the New World, with 45 and 12 species, respectively, reported from North America (Haddock, 1977; Blickle, 1979). North American species of the Holarctic genus *Lepidostoma* number 75, while *Theliopsyche,* which occur along the Appalachian Mountains are represented by 5 species (Weaver, 1983).

Adults of the new species of *Ochrotrichia, Theliopsyche,* and *Nectopsyche* were collected with a UV light trap, while adults of *Agapetus* and *Lepidostoma* were primarily obtained by sweeping or by rearing of pupae taken from streams. Terminology generally follows that of Schmid (1980). Type material will be deposited at the National Museum of Natural History (USNM), Illinois Natural History Survey (INHS), Royal Ontario Museum (ROM), University of Alabama (UA), Florida State Collection of Arthropods (FSCA), and the personal collection of the author.

Agapetus alabamensis Harris, New Species

Fig. 1

In many aspects, this species resembles *A. illini* Ross. It differs primarily in the pronounced serrations at the apex of segment X, the rectangular shape of the inferior appendages, and the lack of dorso-lateral spines at the base of segment X.

Male.—Length 4.5–4.6 mm. Body and wings dark brown, legs yellow. Antennal segments 26. Abdominal segment VI with ventro-mesal process extending to posterior segment VIII. Segment IX generally ringlike in lateral view, fused with segment X dorsally. Preanal appendages nearly half length segment X, in lateral

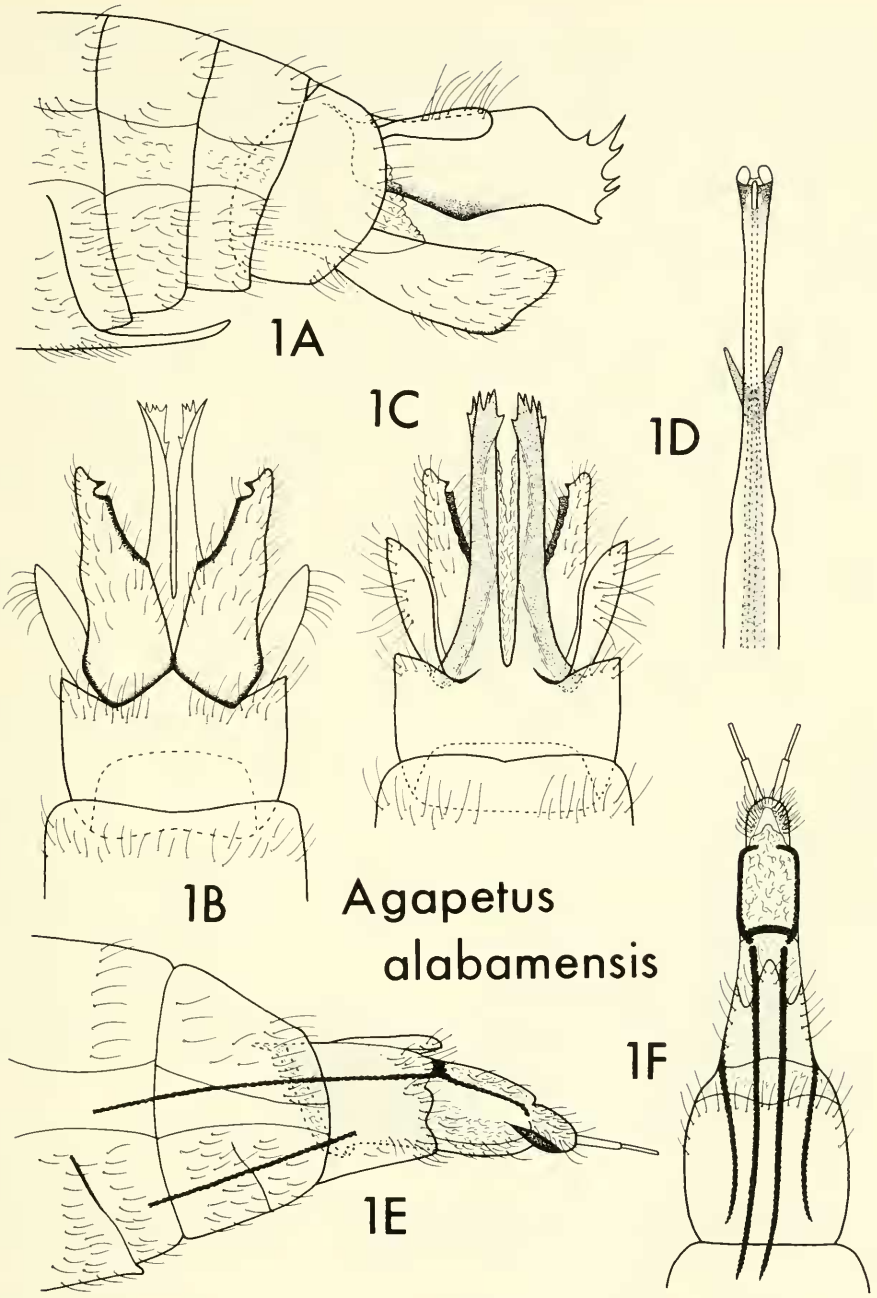

Fig. 1. *Agapetus alabamensis* n. sp., male and female genitalia. 1A, Lateral view ♂. 1B, ventral view ♂. 1C, Dorsal view ♂. 1D, Phallus. 1E, Lateral view ♀. 1F, Dorsal view ♀.

view claviform and originating near dorsum, in dorsal view generally oblong, with basomesal margin convex, and slightly diverging laterally. Segment X membraneous dorsally, sclerotized ventrally; in dorsal view narrow and parallel-sided, divided into two arms distally with heavy serration at each apex; in lateral view these serrations appearing as five large spines projecting dorsally and a small pair of ventral spines projecting posteriorly. Inferior appendages nearly rectangular in lateral view, widened and obliquely truncate posteriorly; in ventral view each triangular with sclerotized spine subapically at ventro-mesal margin. Phallus typical for genus, elongate, tapering distally, with apex bilobed.

Female.—Length 4.6–4.8 mm. Overall appearance similar to male. Abdominal segment VI with short ventro-mesal process. Segment VII ringlike. Segment VIII with dorsal lobe protruding posteriorly, pleural margin incised; two pair of apodemes, dorsal pair originating near posterior margin and ventral pair originating at anterior margin. Segment IX lost. Segment X rectangular in dorsal view, membraneous, with pair of apodemes along dorso-lateral margin connected anteriorly by heavily sclerotized dorsal bridge. Segment XI ovoid, dorsum membraneous, venter sclerotized, with pair of two-segmented cerci.

Immatures.—Both larvae and pupae have been associated for the species, via rearing and the collection of pharate adults. Since immatures of most *Agapetus* species are unknown, a description is not provided herein. The immatures will be deposited for future studies at USNM, INHS, ROM, and UA.

Etymology.—Latin: of Alabama.

Holotype ♂.—Alabama, Tuscaloosa County, unnamed tributary to Wallace Branch, 5 mile southeast Berry (R10W, T17S, S2), 26 April 1984, S. Harris (USNM).

Paratypes.—Alabama, same as above, 9 ♂, 16 ♀ (USNM, INHS, ROM); same, but 11 April 1984, 1 ♂ (UA); same, but 16 May 1984, 2 ♂ (FSCA).

Remarks.—*Agapetus alabamensis* is most easily distinguished from *A. illini,* which it resembles, on the basis of the terminal spines of segment X. In *A. illini,* these spines are minute and numerous, while in *A. alabamensis* the spines are few and elongate. *Agapetus alabamensis* has only been collected in a small, temporary stream of the lower Cumberland Plateau. Final instar larvae were collected in March, with pharate adults present in April. Two specimens were collected in UV light traps operated along the stream in May.

Ochrotrichia elongiralla Harris, New Species

Fig. 2

In general appearance, this species resembles *O. xena* Ross. It differs primarily in the elongate, narrow inferior appendages and in the rounded posterior of segment X.

Male.—Length 4.1–4.8 mm. Antennal segments 26. Forewings brown, with narrow, transverse white band at midlength. Abdominal segment IX generally trapezoidal, narrowing anteriorly in lateral view; deeply incised dorsally; ventrally with heavy, cordate postero-mesal sclerite, narrowly incised laterally. Segment X short, truncate in lateral view, lightly sclerotized dorsally, membraneous ventrally; in dorsal view, round basally narrowing to rounded apex with beaklike protrusion subapically on mesal margin, lightly sclerotized subapically along lateral margin.

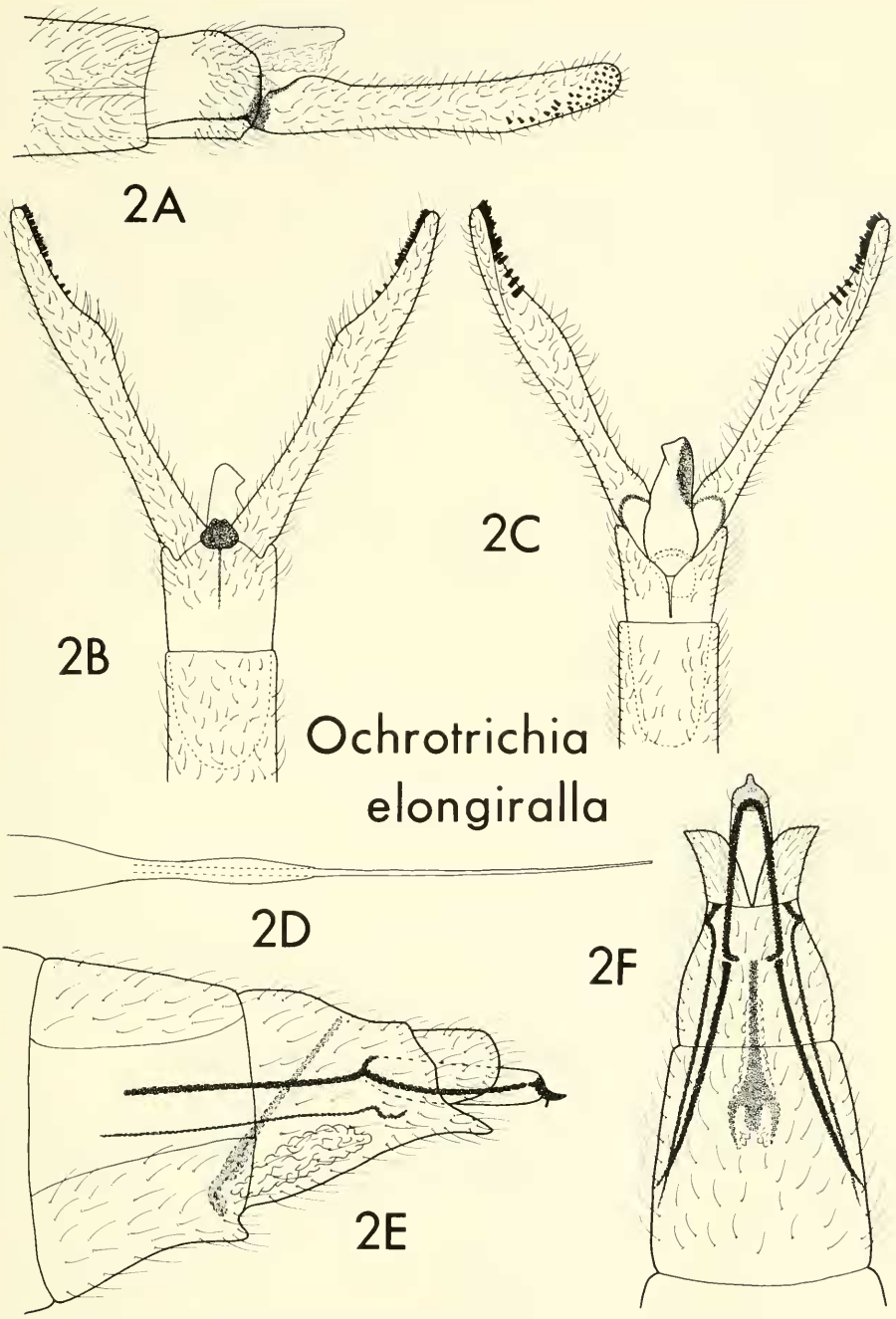

Fig. 2. *Ochrotrichia elongiralla* n. sp., male and female genitalia. 2A, Lateral view ♂. 2B, Ventral view ♂. 2C, Dorsal view ♂. 2D, Phallus. 2E, Lateral view ♀. 2F, Dorsal view ♀.

Inferior appendages long and slender, in lateral view nearly 4 times as long as segment X, base of appendages about same thickness as segment X, subapically with numerous short, black pegs on mesal surface; in dorsal and ventral view, appendages diverging with ridge at ¾ length, each narrowing to rounded apex bearing thick pegs at dorso-mesal margin. Phallus long and thin, widening and tapering basally.

Female.—Length 3.5–5.5 mm. Antennal segments 25. Overall appearance similar to male. Abdominal segment VI quadrate with short ventro-mesal process. Segment VII rounded laterally in dorsal view; in lateral view trapezoidal in shape, with postero-ventral lip; internally with two pair of apodemes, narrow lateral pair originating at posterior margin and extending anteriorly to beyond middle of segment VI, thicker mesal pair originating near middle segment VII, diverging and extending anteriorly to beyond middle of segment VI. Segment VIII deeply cleft dorsally and diverging; in lateral view reduced and rounded distally. Segment IX narrow and retracted into segment VII with pair of lateral apodemes. Segment X short, with small nipple at apex bearing two short setae at antero-lateral margin; in lateral view with heavy acute sclerite at apex. Vaginal apparatus fork-shaped; elongate and parallel-sided postero-dorsally, divided into two acute lateral prongs and round mesal lobe antero-ventrally.

Immatures.—Unknown.

Etymology.—Latin: "elongate and slender" referring to the general appearance of the species.

Holotype ♂.—Alabama, Madison County, Big Cove Creek at Dug Hill Road, 5 miles east Huntsville, 3 June 1984, S. Harris (USNM).

Paratypes.—Alabama, same as above, 78 ♂, 25 ♀ (USNM, INHS, UA, FSCA).

Remarks.—*Ochrotrichia elongiralla* is separated from *O. xena,* which it closely resembles, on the basis of the inferior appendages and shape of segment X. In *O. xena,* the inferior appendages are approximately 2 times the length of segment X and wide at base; in *O. elongiralla* the inferior appendages are nearly 4 times the length of segment X and narrow at base. Segment X is acute apically in *O. xena* and rounded apically in *O. elongiralla. Ochrotrichia elongiralla* has only been collected along a small, gravel-bottom stream in the Highland Rim Plateau.

Theliopsyche tallapoosa Harris, New Species

Fig. 3

This species is most similar to *T. grisea* (Hagen) on the basis of the well developed dorsal process of the inferior appendage. However, while this process is long and linear in *T. grisea,* in *T. tallapoosa* the process is short, curved, and acuminate.

Male.—Length 5.2 mm. Brown in color, with dorsum of head and thorax slightly darker. Head typical for genus, antennal scape 0.4 mm long, maxillary palp 0.5 mm in length. Wings typical for genus, brown with several irregularly shaped white spots; forewings with dense, short black hairs basally; hind wings with long brown hairs basally, along anal vein and at the posterior margin. Legs and abdomen brown. Segment VII with paddle-shaped ventro-mesal process. Segment IX roughly trapezoidal in lateral view; broadly excised dorsally. Segment X about ½ length of inferior appendages, in dorsal view deeply incised, bearing pair of long setae at apex, four pair mesal setae basally; intermediate appendages spini-

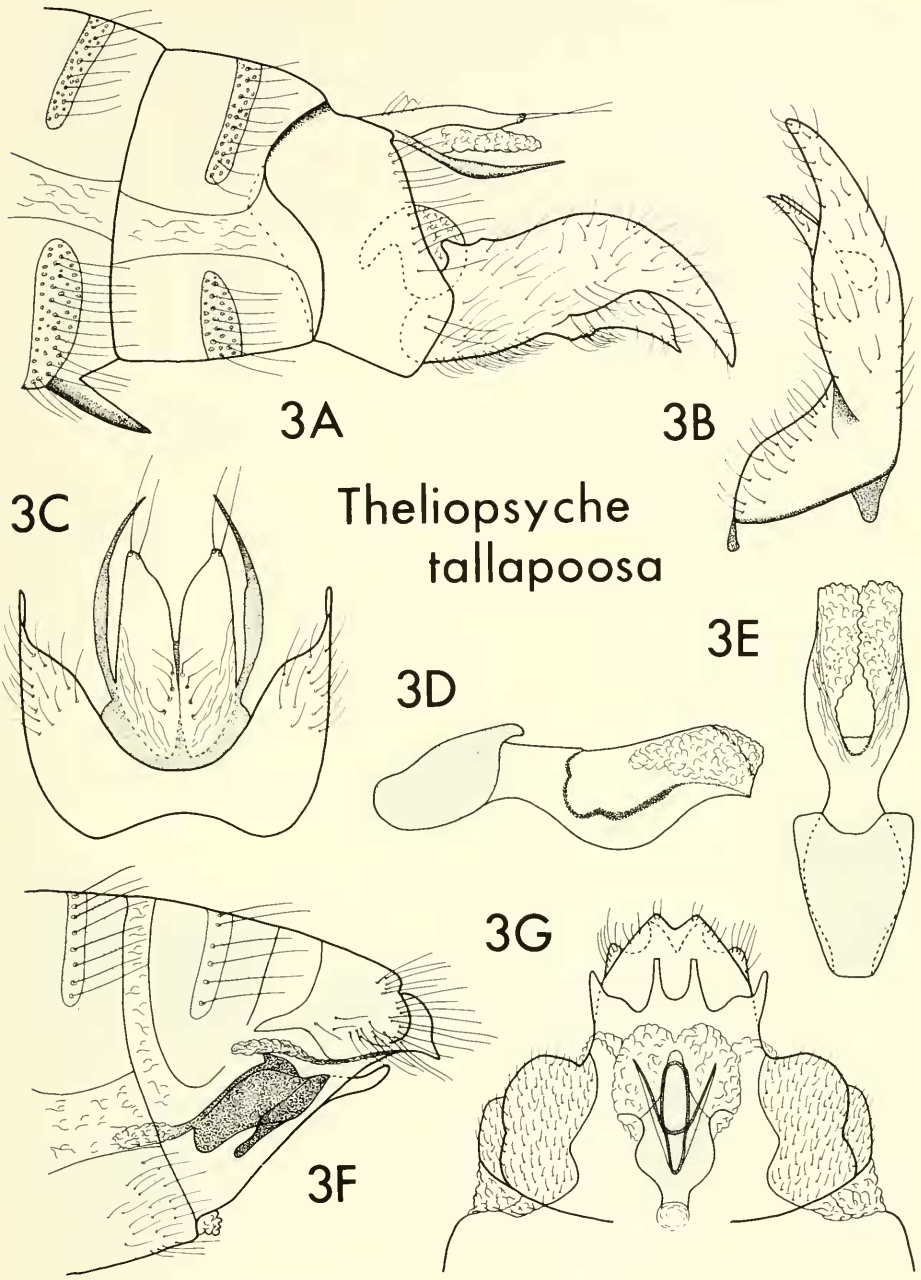

Fig. 3. *Theliopsyche tallapoosa* n. sp., male and female genitalia. 3A, Lateral view ♂. 3B, Inferior appendage ♂, dorsal view. 3C, Dorsal view ♂. 3D, Phallus, lateral view. 3E, Phallus, dorsal view. 3F, Lateral view ♀. 3G, Ventral view ♀.

form and sclerotized. Inferior appendages each with dorsal process thickened and elongated slightly beyond ventral process, in lateral view dorsal process curving ventrad to acute apex. Phallus sinuate with narrow phallotremal sclerite, parameres absent, phallobase obscured by sclerotized phallic shield.

Female.—Length 5.2 mm. Overall appearance similar to male. Antennal scape 0.5 mm in length, maxillary palp 0.8 mm long. No sexual dimorphism evident in wings. Posterior margin of sternite VII with four raised points in ventral view. Vaginal apparatus with anteriorly directed spermathecal sclerite in ventral view, pair of membraneous lobes extending posteriorly, short rounded process at center. In lateral view spermathecal process generally oblong, narrowing posteriorly.

Immatures.—Unknown.

Etymology.—Named for Tallapoosa County.

Holotype ♂.—Alabama, Tallapoosa County, Timbergut Creek, downstream crossing Hwy. 22, 19 May 1984, S. Harris and P. Lago (USNM).

Paratypes.—Alabama, same as above, 1 ♂, 1 ♀ (USNM).

Remarks.—*Theliopsyche tallapoosa,* along with *T. grisea,* is separated from other *Theliopsyche* by the expanded dorsal process of each inferior appendage. However, while this process is elongate and narrow in *T. grisea,* in *T. tallapoosa* the process is short and acuminate. Larvae of *Theliopsyche* are thought to inhabit springs and springruns (Wiggins, 1977; Weaver, 1983), however, *T. tallapoosa* was collected along a small (6 m wide), swift Piedmont stream, with rocky bottom.

Lepidostoma weaveri Harris, New Species

Fig. 4

This species is similar in general appearance to *L. swannanoa* Ross and *L. compressum* Etnier and Way. However, the structure of segment X and the inferior appendages render the species distinct.

Male.—Length 6.8–7.8 mm. Body, wings, and appendages light brown, head and thorax slightly darker brown. Antennal segments 40, with scape 0.6 mm long. Maxillary palp 1.3 mm in length. Wings with no obvious sexual dimorphism. Abdominal segment IX quadrate laterally, dorsally broadly incised at anterior margin. Segment X in dorsal view fused with segment IX anteriorly, posteriorly divided into two converging lateral arms, each rounded apically and tipped with several stout setae; in lateral view domed baso-dorsally, narrowed and abruptly upturned distally. Inferior appendages each divided into a thin dorsal and thick ventral process, appearing nearly equal length in lateral view, ventral process with short, thin mesal harpago subapically; in ventral view dorsal process strongly curved, narrow basally, widening slightly apically, ventral process wide basally, narrowing to rounded apex and extending slightly beyond dorsal process. Phallus with phallobase extending dorsally over phalicata in pair of membraneous lobes, phalicata bulbous, phallotremal sclerite round laterally, curved dorsally, parameres absent.

Female.—Length 7.2–8.2 mm. Overall appearance similar to male. Antennal segments 40, with scape 0.6 mm long. Maxillary palp 1.1 mm in length. Abdominal segment VIII with tergite quadrate, sternite reduced with posterior margin emarginate. Segment IX with small dorso-lateral sclerite. Segment X reduced to pair of small lobes posteriorly, fused anteriorly with segment IX. Vaginal apparatus diamond-shaped ventrally, with narrow keyhole-shaped postero-ventral process.

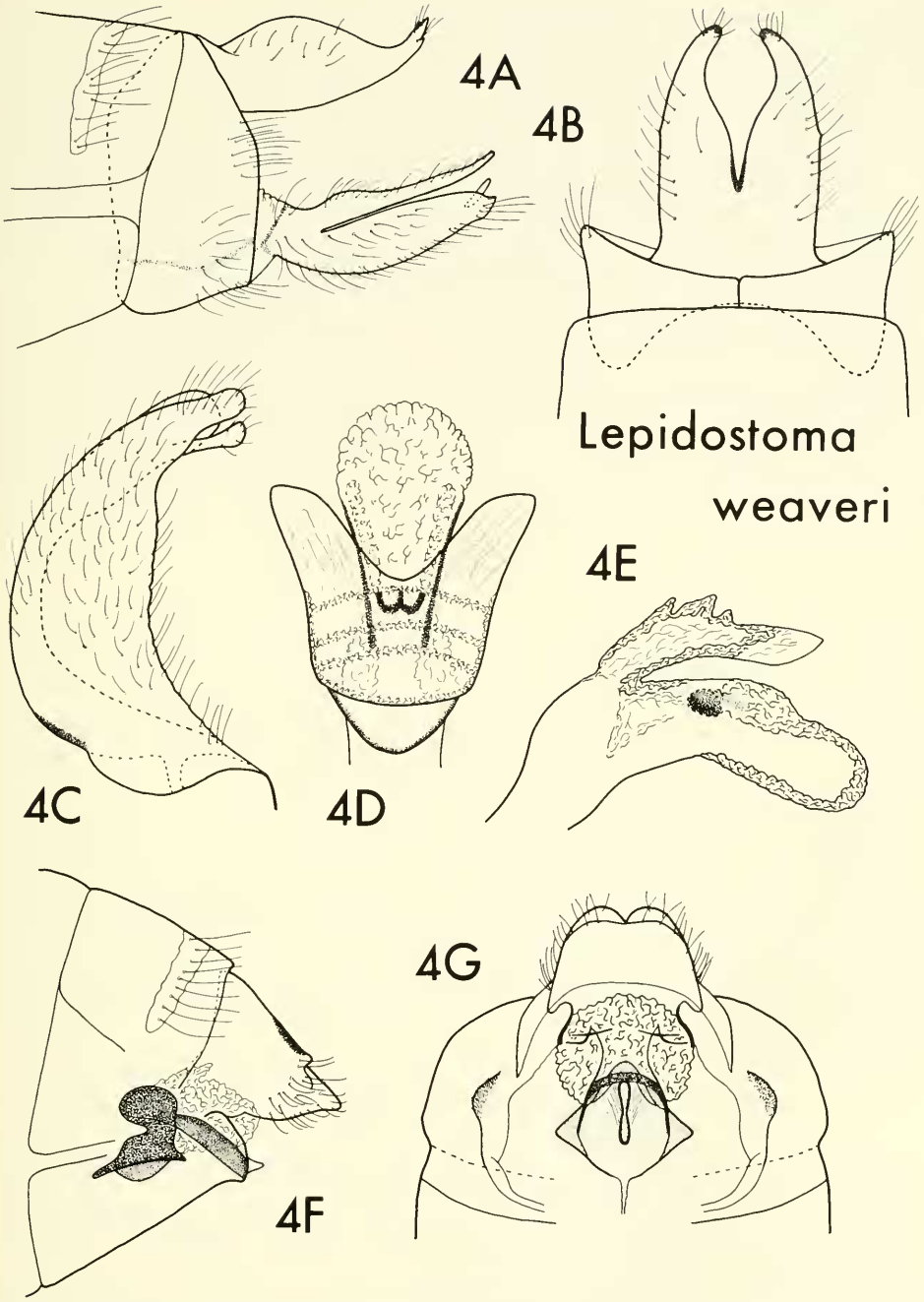

Fig. 4. *Lepidostoma weaveri* n. sp., male and female genitalia. 4A, Lateral view ♂. 4B, Dorsal view ♂. 4C, Inferior appendage ♂, ventral view. 4D, Phallus, dorsal view. 4E, Phallus, lateral view. 4F, Lateral view ♀. 4G, Ventral view ♀.

In lateral view generally trapezoidal in shape, incised anteriorly, posteriorly with thin ventral band.

Immatures.—Both larvae and pupae have been associated for the species, via rearing of adults. Using the key presented by Weaver (1983), larva fall in the subgenus *Nosopus,* on the basis of the panel-type leaf case with parallel sides and length of the postmentum being greater than the ecdysal line. Final instar larvae were collected in February and March. Since so few of the *Lepidostoma* species have associated immatures, descriptions of the larvae and pupae are not included herein. The immatures will be deposited for future reference at USNM, INHS, ROM, and UA.

Etymology.—Named for John S. Weaver, III in recognition of his studies on the Lepidostomatidae.

Holotype ♂.—Alabama, Tuscaloosa County, unnamed tributary to Tyro Creek at bridge 303, 4.5 mile east New Lexington (R10W, T17S, S15), 12 March 1984, S. Harris (USNM).

Paratypes.—Alabama, same as above, 7 ♂, 2 ♀ (USNM, INHS, UA), same, but 14 March 1984, 2 ♂, 4 ♀ (USNM, INHS, FSCA), same, but 15 March 1984, 3 ♂, 10 ♀ (USNM, INHS, UA, ROM), same, but 13 March 1984, 3 ♂, 2 ♀, same, but 19 March 1982, 1 ♂, unnamed tributary to Wallace Branch, 5 mile southeast Berry (R10W, T17S, S2), 15 March 1984, S. Harris, 3 ♂, 1 ♀ (USNM, INHS).

Remarks.—Many of the characters of the male genitalia of *L. weaveri* appear to be intermediate between those of *L. compressum* and *L. swannanoa.* Segment X resembles that of *L. compressum* in its sinuate lateral appearance, although in *L. compressum* the distal arms are much longer and the dorsal incision much deeper. In *L. swannanoa,* segment X is wedge-shaped laterally and serrate at the dorso-lateral margins. This serration is lacking in *L. weaveri* and *L. compressum.* The inferior appendages of *L. weaveri* are similar to those of *L. swannanoa,* although in *L. swannanoa* the dorsal process is expanded more apically than in *L. weaveri.* In *L. compressum* this dorsal process is more elongate than in either *L. weaveri* or *L. swannanoa.* The structure of the phallus and the female genitalia are similar in *L. weaveri* and *L. swannanoa.* As with *Agapetus alabamensis, L. weaveri* is restricted to several small, spring-flowing, temporary streams on the Cumberland Plateau. Adults were collected by sweeping along the stream in March and by rearing pupae.

Nectopsyche paludicola Harris, New Species

Figs. 5–6

The narrow base of the inferior appendage aligns this species with *N. exquisita* (Walker) and *N. candida* (Hagen). However, the overall appearance of the inferior appendage is more stout than in either *N. exquisita* or *N. candida.* In addition, *N. paludicola* differs in having brown wings.

Male.—Length 7.5–9.0 mm. Head and thorax, dark brown with profuse white hair dorsally and dorso-laterally. Eyes small, about ⅓ interocular width in dorsal aspect. Antennae long (approximately 76 segments), with white bands fading distally. Legs light brown. Forewings gray to tawny, with indistinct brown spots along the veins and in cluster at apex, no coloration pattern evident with wings folded, long white hairs basally, short dark and white hairs spread over wing surface. Hind wings uniformly gray with conspicuous veins, surface covered with

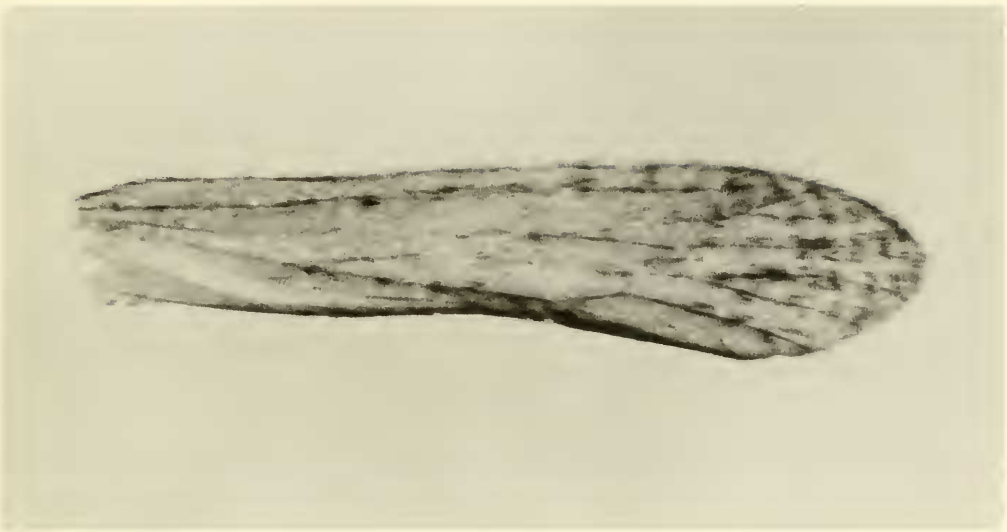

Fig. 5. *Nectopsyche paludicola* n. sp., right forewing ♂.

short, dark hairs. Abdomen light brown with greenish hue, genitalia typical for the genus. Segment IX trapezoidal with short dorso-mesal process, preanal appendages (dorso-lateral arms) long, curving slightly ventrad and tapering to bulbous apex. Intermediate appendages of segment X extending to near apex of inferior appendages; in lateral view, these appendages wide basally, narrowing and parallel-sided distally. Inferior appendages oblique in lateral view, narrow at base, widening at apex with narrow sclerotized lateral thumb, ventral margin irregularly incised; ventro-mesal filaments thick and long with lateral accessory filament. Phallus typical for genus with large ventral plate and small phallotremal sclerite, external periphallic processes of phallic shield narrow with bulbous tip.

Female.—Length 7.0–7.5 mm. Overall appearance similar to male with genitalia typical for the genus. Segments IX and X fused, narrowly triangular in lateral view with appendages long and slender. Valves fingerlike. Vaginal vestibule long and cylindral. Vaginal apparatus round in ventral view with pair of round, posterior plates; in dorsal view with narrow ventral keel.

Immatures.—While *Nectopsyche* larvae have been collected at the type locality, a positive association is not yet possible.

Etymology.—Latin: "marsh-dweller" referring to the habitat of the species.

Holotype ♂.—Alabama, Baldwin County, Farris Creek at Hwy. 59, 20 August 1984, S. Harris and M. Mettee (USNM).

Paratypes.—Alabama, same as above, 4 ♂ (USNM, INHS), same, but 3 July 1984, 2 ♂, 1 ♀, S. Harris (USNM), same, but 18 August 1983, 2 ♂, S. Harris and P. O'Neil, same, but 11 May 1982, 22 ♂, S. Harris (USNM, INHS, UA, FSCA), Red Hills Creek at Hwy. 59, 18 August 1983, 19 ♂, 22 ♀, S. Harris and P. O'Neil (USNM, INHS, UA, FSCA); Mobile County, Nobodies Creek, upstream crossing Co. Hwy. 96, 13 May 1982, 1 ♂, S. Harris, Little Creek, 2 miles southeast Citronelle, 12 May 1982, 2 ♂, S. Harris; Washington County, Okwakee Creek at Co. Hwy. 9, 13 May 1982, 8 ♂, S. Harris.

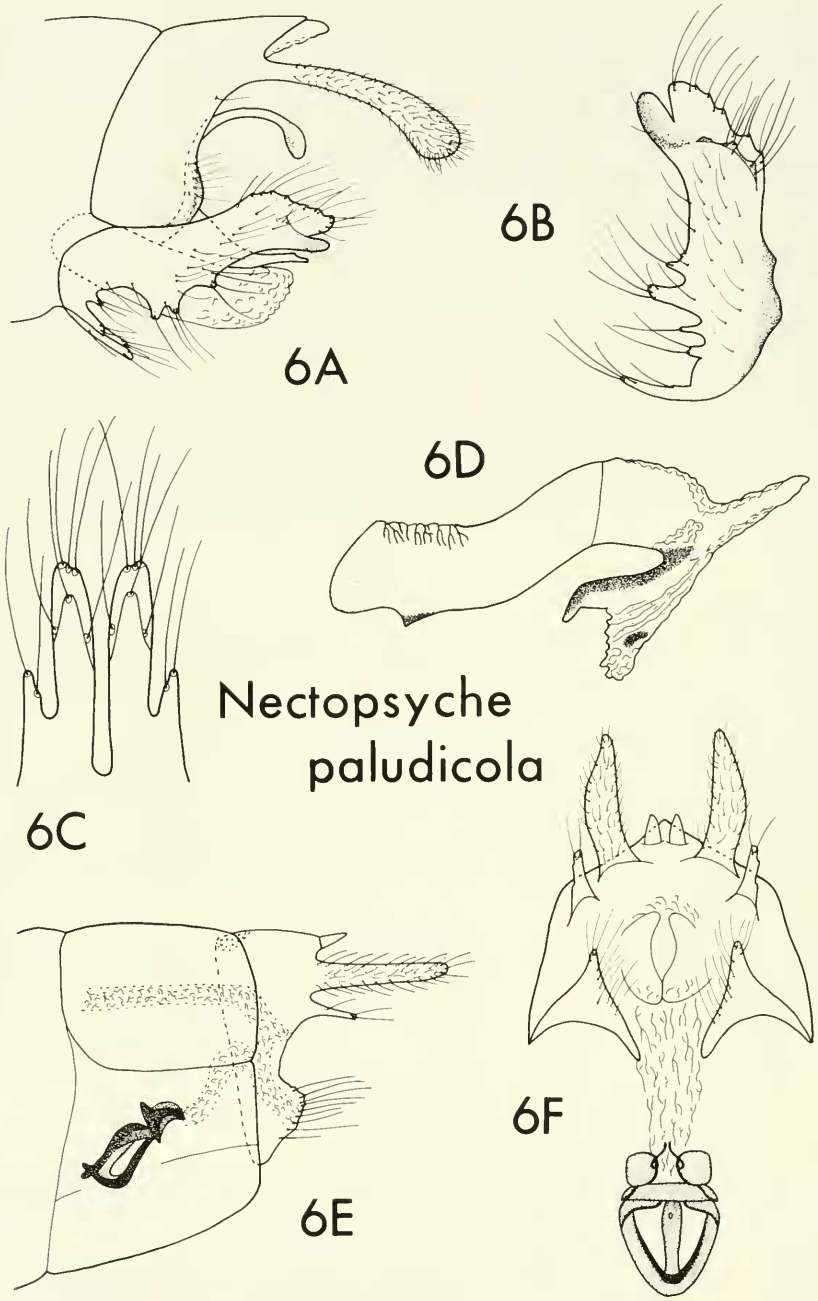

Fig. 6. *Nectopsyche paludicola* n. sp., male and female genitalia. 6A, Lateral view ♂. 6B, Inferior appendage ♂, lateral view. 6C, Genitalic filaments at base of inferior appendage, ventral view. 6D, Phallus, lateral view. 6E, Lateral view ♀. 6F, Ventral view ♀.

Remarks.—On the basis of the male genitalia, *N. paludicola* resembles *N. candida, N. exquisita,* and *N. tavara* (Ross). However, while all of these species have predominantly white wings, *N. paludicola* has brownish-gray wings. *Nectopsyche paludicola* has been collected primarily along small, sand-bottom streams draining *Juncus* marshes in coastal Alabama.

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Literature Cited

Blickle, R. L. 1979. Hydroptilidae (Trichoptera) of America, north of Mexico. Bull. N.H. Agri. Exp. Sta. 509: 1–97.

Haddock, J. D. 1977. The biosystematics of the caddisfly genus *Nectopsyche* in North America with emphasis on the aquatic stages. Am. Midl. Nat. 98: 382–421.

Schmid, F. 1980. Genera des Trichoptères du Canada et des États adjacents, pt. 7, 296 pp. *In* Les insectes et arachnides du Canada. Agri. Canada, Ottawa.

Weaver, J. S. 1983. The evolution and classification of Trichoptera, with a revision of the Lepidostomatidae and a North American synopsis of this family. Ph.D. dissert., Clemson Univ. 411 pp.

Wiggins, G. B. 1977. Larvae of the North American caddisfly genera (Trichoptera). Univ. Toronto Press, Toronto. 401 pp.

———. 1984. Trichoptera, pp. 271–311. *In* Merritt, R. W., and K. W. Cummins, eds., An introduction to the aquatic insects of North America. Kendall/Hunt Publ. Co., Dubuque. 722 pp.